SUGGESTIONS AND SCHEME

FOR

STEAM NAVIGATION

OF THE

RIO NEGRO,

Submitted to His Excellency the Governor
and to the Honourable Congress of Amazonas

BY

LEONIDAS NORZAGARAY-ELICECHEA.

To His Excellency

Dr. ANTONIO CONSTANTINO NERY,

Governor of the State of Amazonas,
etc., etc., etc.

The natural conditions and promising economic and political future of your native land have led me to think that my earnest good-will and practical work might contribute something towards it by removing the chief obstacles now existing in the main waterway, *i.e.*, the magnificent stream of the Rio Negro; and my belief has not been vain, since my inspiration and faith as a worker arose within the sphere of activity of your patriotism, where the effect of civilisation and the evidence of progress are actual facts.

It is consequently to your elevated spirit of patriotism that is specially due the present modest work, which I have the honour of dedicating to you, as a distinguished son and able ruler of the most flourishing State of the Union.

I pray, therefore, you will deign to accept this respectful offering, and honour it by the invaluable addition of your criticism and judgment.

Very obediently and sincerely yours,

L. NORZAGARAY E.

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General Observations.

The careful surveys and studies that I have made in the course of my explorations and travels in Colombia, Venezuela, and this important State of the Brazilian Confederation, a thorough knowledge of their admirable hydrographical system, of the industrial vitality of their related arteries, and of the original difficulties against which the towns and even rivers of each country in this wonderful common centre are still struggling, in order to bring to the Amazon the invaluable tribute of their resources and industries, justify me in believing that there is a common duty which morally, economically, and politically makes it incumbent on the three adjoining countries to utilize, for their joint and individual benefit, the natural connections which the generous hand of the Creator has established between them ; and the spirit of fraternity and progress which happily animates the illustrious rulers of the three countries and of the flourishing State of the Amazon in particular, proclaims that the opportune hour for making these invaluable connections effective has at length arrived.

Much has already been written and said about the wonderful communication of the Amazon with the Orinoco, and of the vast importance of this link in regard to the political and industrial future of South America ; yet human endeavour has so far done nothing to advance this work, make use of it or develop the power and volume, the potential progress that its existence implies, for what was undoubtedly wanting was an immediate centre of illumination and activity, which, extend-

ing towards it its beneficent influence, would also implant its own spirit of enterprise ; but now that this centre exists upon the very axis of the former, just where the progressive development of the vast and bountiful basin of the Amazon most requires it, what should and can be promised to the industrial world is what I undertake to realize, with the help of God and the enterprising spirit of the State of the Amazon, to which I propose, through the worthy medium of its able ruler, His Excellency Dr. Constantino Nery, to establish steam navigation throughout the whole of the commercial part of the Rio Negro, from the town of Manaos itself up to the "Cocuy" and the respective ports of Venezuela and Colombia.

In putting forward this idea and making this proposal, I may assert that it is no exaggeration to say that from the geographical, economical, and political points of view alike, there is not in the hydrographic scene of the universe a river that can excel or even equal the equinoctial Rio Negro, for no other plays in its sphere the important part which this magnificent and favoured stream acts in its valley, where, besides the good climate, the excellence of its waters, its immense volume, its large population, and its abundant and varied natural wealth, it unites two great rivers, concentrates six nations and satisfies to a great extent the imperative necessity of interior international communication in South America.

This brief epilogue will appear strange and, perhaps, absurd to anyone who, unaware of the real reasons, wishes to know why, in view of the above facts, the Rio Negro is still inaccessible to such as are willing to make its acquaintance by stroke of oar and hauling of two-rope; but on the other hand, justice will be done to its merits by those who know : Firstly, that because of the ambition of conquest, the jealousy of dominion and the mutual mistrust that naturally existed between the Kingdoms of Spain and Portugal during the conquest and colonisation of this river, it was to their interest to maintain and even strengthen the obstacles to the navigation of the river ; Secondly, that the free nations which arose from this con-

quest and colonisation, unfortunately inherited, together with their original and characteristic indolence, the vices and errors of an ill-advised ambition, and the selfishness that engendered them ; and, thirdly, that there was lacking, as I have already said, a centre of civilisation and life in its stream that would reflect the light of the future in the dark crystal of its waters.

Spain and Portugal, repentant of the political and economic errors of their halcyon days, now earnestly desire, as do all the Old World Powers, the development of production and consumption in the markets of South America, whilst all nations of this coveted and virgin Continent have already learnt, and wish to put into practice without delay, the wise lesson of ancient and modern times, which shows the union of the weak to be the only means of resistance and freedom against the ambitious and usurping power of the strong ; and this at the very moment that the flourishing city of Manaos, capital of the State of Amazonas, lights up with the shining beacon of its port, the waterway which is to meet in a great measure both the demands of universal industry and the urgent necessity of internal communication and union between the young Republics of South America.

Could there be a happier combination of circumstances in favour of the grand connecting link between the Amazon and the Orinoco ?

Let us now see, by succinct analysis, whether it can really perform the many-sided and noble task before it.

I.—Geographical Importance.

Situated in two hemispheres, between latitude 3° S. and latitude 5° N., and longitude 59° and 75° W. of Greenwich, it forms a triangular basin of irregular form, bounded on the South, North and West by the dividing summits of the principal basins of the Solimoes, the Orinoco and the Essequibo respectively, and the bed of which is invariably marked by the intersection of the three planes or interior declivities which form it.

It rises in the forests of Papunagua, in the Republic of Colombia, and at the foot of the hills of Padavida and Tunai, at a point which may safely be taken as in latitude 2° N. and longitude 70° W. of Greenwich, that is, on the southern base of the dividing line of the Amazon and the Orinoco, formed by the geological connection of the Eastern Andes with the Western eruptive depression of the Parima table-land which serves it as a base over three-quarters of its course.

First Part: From its source to the mouth of the Pimichin channel—500 kilomètres.

With a minimum initial depth of 4 mètres, a mean width of 300, an average flow of 6 kilomètres an hour and a general direction S.W.-N.W., it receives the Azumarci which presses it in with the Inirida on the N.W. and the Pimichin, which, sharing narrow limits with the channel of Yavita, the principal source of the Atabapo, brings it near the latter in such a manner that they might be said to join across the forest which separates them.

Second Part: From the mouth of the Pimichin channel to the mouth of the Vaupez or Cayari—350 kilomètres.

Changing the original name of Guainia for that of Rio Negro, which it keeps through the remainder of its course, now free from the orographic influence of the Caparro Mountains, and subject to the contrary action of the Valley of the Casiquiare, it turns suddenly to the South, reduces its flow to an average of 5 kilomètres an hour, and unites with the Casiquiare at first by means of the channel of San Miguel, and then directly, the dimensions of its bed and volume being considerably augmented, only to be reduced on passing from San Carlos to San Felipe, a port of the Republic of Venezuela, and an ancient Spanish fortress, respectively.

At the island of San José it bifurcates, and at the foot of the "Piedra del Cocuy," a common boundary-mark of Brazil, Venezuela and Colombia, it again narrows at Maravitana, an old fort of the

time of the Portuguese dominion ; it then receives the Cie and the Izana on its right bank, and when exactly on the equinoctial line, unites with the Vaupez or Cayari, which starting from the Eastern Andes, and from watersheds still unknown, multiplies the volume of the waters of the Rio Negro, changes the direction thereof and gives a new aspect to the middle part of its course.

Up to this point the bed of the Rio Negro is invariable and deep, with a slight but uniform slope, and a flow apparently unchangeable.

THIRD PART : From the mouth of Vaupez to that of the Padauiri—340 kilomètres.

Owing to the Anary range, which determines its confluence with the Vaupez, it turns sharply to the East, making for itself a winding, deep and tortuous channel along the granite bass-reliefs of the Parima base, until at San Gabriel and Camanaos it cuts the main axis of these latter, which presses it into the Fortaleza, suddenly bifurcates it between Curucuy and Buburi, then reducing it to one navigable bed only, which is narrow, has a strong current, and is deep at Tapajoz and Camanaos, and which then appears on its right bank and under the name of the Curicuyari range, runs to the S.W., forming with the Anary range on the N., and with the dividing line of the Yapura on the S., the secondary valleys of the Curicuyari and the Marie respectively.

At Camanaos it regains its former level, recovers its calm and its characteristic appearance, ramifies its "thalweg," approaches the Yapura from Santa Isabel, by means of its tributaries the Tea, Anauxi, Aiauna, Jurubaxi and Ariraa, and receives the Padauiri, which joins it by its left bank with the Pasimoni, a tributary of the Casiquiare, and which concludes the middle part of its course with the last continuous manifestations of its archaic or eruptive bed.

FOURTH PART : From the Padauiri to the Barra —510 kilomètres.

United with the Padauiri, and now in the central valley of the Amazon, it flows to the S.E.,

being both attracted and checked by its variations of level, volume, and current.

Into this part flows the Rio Blanco, which connects it closely with the Essequibo on the N.W., and it is there that the principal tributary of the Amazon widens and subdivides, bearing a great volume of water, so that it becomes a veritable *fresh-water archipelago* more than 15 kilomètres wide in some places, and where the navigable channel drops at times to a depth of about 3 feet.

Bearing in mind, in regard to this last section, the common fact that the co-efficient of inundation quintuples annually the volume of tropical currents, and leaving, till further on, the study of navigation by steam at San Gabriel and Camanaos, it results that only at these two points does the Rio Negro present serious difficulties for the regular navigation of its whole course.

Geographical Table.

PRINCIPAL CO-ORDINATES :

Mouth of—		
the Pimichin	2° 43′ 10″ N.	— 67° 39′ 3″ W. G.
,, San Carlos	1° 55′ 2″ N.	— 67° 9′ 14″ W. G.
,, Cocuy	1° 13′ 52″ N.	— 66° 57′ 34″ W. G.
,, Vaupez	0° 0′ 0″ N.	— 67° 10′ 21″ W. G.
,, Padauiri	0° 10′ S.	— 63° 58′ 20″ W. G.
,, Rio Blanco	1° 20′ S.	— 61° 58′ 21″ W. G.
,, Rio Negro	3° 10′ S.	— 60° 50′ W. G.

Total length : 1,700 kilomètres.
Area of the basin : 648,000 square kilomètres.
General direction : N.W. to S.E.
Average speed : 5 kilomètres an hour.
Average width : 800 mètres.
Mean temperature of the valley : 27° centigrade.

II.—Economic Importance.

Although the geographical importance of a river is sufficient in itself to show in general both its economic and political value, a separate analysis of each of these features proves the truth of this principle as applied to the Rio Negro.

So great is the importance that Economic Science attaches to navigable rivers in general, that it distinguishes them under the graphic term of *moving ways*, and its aim, that of the attainment of national wealth and power, has always led to the foundation of the great Industrial and State Capitals at their confluences, and on their banks.

But we shall be able to appreciate *ad absurdum*, and at once, the economic advantages of a navigable river, if we suppose that owing to some extraordinary geological cataclysm, it were to disappear; just as we value at its full worth the good health which gave us free circulation of the blood, when it has been interrupted by a paralytic stroke. Granting such a hypothesis,—would it be possible to replace the Amazon and the Rio Negro for example, and would there be sufficient wealth and energy to carry through such a tremendous task? The difficulties with which Providence has surrounded some of its grandest works, in order to test the strength of human endeavour—San Gabriel and Camanaos, for example—proclaim aloud and in concert that such an enterprise would be even more absurd than the hypothesis.

This principle of general utility being established let us examine, with respect to the Rio Negro, the relation which exists between the geographical qualities of its current and the particular features or properties of its natural life, and that between the latter and the analogous situation of the related and complementary regions that bound its basin in the three countries which are joint owners.

Natural Resources.

The natural products known to be found up to the present on the Rio Negro and its affluents, and the producting zones discovered, are :—

India-Rubber.—In the greater part of its course, and particularly on the Casiquiare, the Izana, the Vaupez, the Cababuri, the Tea, the Padauiri, and other affluents.

Rubber.—On the Guainia, the Izana, and the Vaupez.

Piassava.—Throughout its valleys; this is its chief product and that to which it apparently owes the peculiar colour of its waters.

Sarsaparilla.—On the Guainia, the Vaupez, the Izana, the Cababuri, and the Mauira especially.

Chestnut.—On the Mauira, at Santa Isabel, and other places.

Puxiri.—On the Tea, the Anauia, the Ariguana, and especially the Jurubaxi.

Vanilla.—In the greater part of its islands and banks.

Cumare.—On the Vaupez, the Izana, and on the first and second parts of its course.

Sarrapia, seje, copaiba oil, Peruvian bark, Guiana bark, and other valuable products, are found in abundance.

Agricultural Products.

Besides all the edible products of the tropics, cotton, tobacco, cocoa, and indigo are produced in luxuriant abundance, for the vegetable deposit which covers the islands, summits and slopes of its basin, is very fertile and exceedingly favourable to the growth of these plants.

The original and colonising Races.

Although the anthropology of the primitive races who peopled South America and inhabit a great part of its territory is chaotic matter, which is closely related to the geological process of its nature and aspect, there is a proven fact, the ethnographic theory, that the Rio Negro with its principal affluents the Rio Blanco, the Vaupez and the Casiquiare, especially marked the Guarani migration, which in the Christian era passed from the Plata to the Amazon, and from the latter to the Orinoco and the Essequibo, and of which there has been left to us a testimony, a visible

and reliable proof, in the pictorial archæology which the primitive rocks in the bed, the barks and summits of these rivers show.

From that time to the present, ethnological unity has been established upon the hydrographic union between the Amazon and the Orinoco, and favoured since by common necessity and by the similarity of industry, it has gradually become closer in spite of political jealousies, until the general navigation of the Rio Negro has become an imperative commercial necessity for the common welfare of the three countries and peoples who possess special rights and duties in it.

Since 1853, when the Spanish and Portuguese took natural possession in contrary directions, the Tupi and Guarani tribes, that dwelt on its banks, and who were always the most open to colonisation and conquest, have gradually become absorbed and mingled with the European and African races, rulers and slaves, until they have been amalgamated, and have completely lost their unity and their type as an original race. It may be remarked that this fusion has been contributed to in a great measure by the wise creation of the *general tongue* which the Jesuit Missionaries formed out of the innumerable dialects of the Tupi and Guarani tribes, and that like Sanscrit, which the Brahmins invented with the same object and under similar circumstances in Asia, it has been up to the present the best intellectual medium between the natives and foreigners.

At the present day the primitive element is solely, in each principal basin, that which under the compulsion of the law and the persecutions of the stronger tribes, or fleeing from the conquering invasion, had to abandon the waterways of its enemies and take refuge in the valleys and the summits of the more important tributaries, and thus it is that this element is now found distributed in the basin of the Rio Negro in the following manner :

The Macuchies and the Arapichauas on the Rio Blanco.

The Macus on the Tea, the Jurupaxi, the Cababuri and other affluents.

The Tucanos, Piratapuyos, Dizanas, Cubebas, Terianos and Umauas on the Vaupez.

The Carotanas on the Izana and the Cie.

The Vares on the Casiquiare.

The Banibas, Carrus, Carri-carrus, and others on the Guainia or Upper Rio Negro; it being observable that on the banks of this river live very few native families proper, owing to the mingling of races that has gradually taken place through trade, and which will eventually effect a complete transformation of the original population, to its great advantage, when steam navigation, aiding industry and colonisation, contributes its quota to the full realisation of this end.

The colonising Race.

The colonists proper are now an integral part of the half-bred native race who owe their origin to them, and is composed mainly of Portuguese emigrants who went there attracted by the facilities and profits connected with the rubber industry, and being obliged by necessity and convenience to mix with the native race, have formed new families in it. However, there have not been wanting many analogous cases of industrial population, offered by good colonists of other countries.

The number of this population has been, is, and will always be, the real coefficient of prosperity on the Rio Negro, for to it is due the present-day civilisation of its banks, the notable advancement of extractive industries, and the progressive development of commerce so far as the latter has been favoured and stimulated by steam navigation, which is, without doubt, the chief factor in its progress, and on which depends, and from which is expected, all that is wanting to the work of colonisation and industry in general so that its civilising action may be extended and established throughout the whole course of this important river.

This class of people then, distributed from Manaos to San Gabriel, does not appear any more in family community or civilian form except on the

Upper Rio Negro and the Casiquiare, where the majority is likewise composed of natives of Venezuela who trade with the market of Manaos, and who desire and require to regularly establish the transit commerce which has been agreed upon by Brazil and Venezuela in their Treaty of peace and friendship, boundaries, navigation and commerce.

And there is also now a new colony of Colombian traders who, thanks to laudable efforts of exploration, work the rubber and the other natural resources which abound on the Upper Vaupez, and whose products must naturally increase commercial industry in the rich valley of the Rio Negro.

Existing and possible Industries.

It is a well-known fact that in the early stages of social life, necessity, always under the favour of Providence, creates and establishes the first industries and that, reciprocally, industry then engenders necessities in the advanced period of the former.

It was thus, following out this natural law, that the chestnut was gathered, the mande, the hammock or net, and the warp of the Rio Negro were made, all inspirations arising from necessity and human instinct based on the divine goodness and wisdom of primitive nature, and it is due to the same law that striking signs of the inverse phenomenon are already visible there ; for, under the stimulating action of commerce and the regenerating influence of outside ideas and customs, the progressive evolution of the mind and of primitive usages is necessarily carried out, with new needs, which are those that have advanced the extractive industry, by the production of india-rubber and the resultant carrying trade, and the steam navigation now in existence.

Now, all these products of the extractive industry which meet the first needs of the species in the forest age are, it is well known, the invaluable raw material of civilised industry which, when directed by science, can be adapted by it to

the tastes and needs of a higher social order ; and thus the chestnut which nourishes the savage, the moriche, the cumare, the curagua, and the cotton which give him the fibre and thread for his nets ; the wood of which he makes his canoes and pirogues ; the fruit which the mande gives him, the piassavo with which he makes tow-lines for his vessels, and the vegetable juices which he uses to keep himself in health, are so many other articles of export and value in the great markets of human trade ; for which reason we draw the logical consequence that all the callings enumerated, and which constitute the natural industries of the Rio Negro, come chiefly within the manufacturing industry of the great factories, to which they will be able to supply a considerable quantity of produce when the complete and regular working of steam traffic assists general colonisation by facilitating industry and transport.

The abundance of natural resources, particularly of india-rubber, and the comparative scarcity of the producing population or labour, has so far demanded the whole attention of the latter to the methodical working of the former ; but when the economic equilibrium is established, either by an increase of population or by levelling of produce, or by both, the second industrial stage of the Rio Negro will necessarily be reached, together with its life proper, or the progressive development of agriculture and of cattle breeding in particular, with the regular and profitable planting of the banana, yucca, maize, rice, the sugar cane on a large scale, coffee, cocoa, cotton and tobacco, and clearings for sowing of lands for pasturage and cattle breeding, in which direction the far-seeing wisdom of the State will make every effort to prevent as far as possible, or at least mitigate, the effect of the serious crises which usually arise from sudden economic transitions.

It might be supposed that we are exaggerating, and that the picture drawn is a mere invention of a daring mind, if it were not, as it is, actually based on the undeniable testimony of facts, and proved by all who live on the Rio Negro, and have there tested on a minor scale the success of

its climate, waters and soil in the reproduction of plants and cattle, just as we found the industrial future of its current on the dynamic power of the falls in its course.

Commerce and Navigation.

The evolutionary process of the trade of the Rio Negro since its beginning to the present day, is a regular process of social evolution which we have already pointed out, when dealing with its population, and which serves as a thermometer to measure the degree of culture and development of which its future is capable.

A fatal sequel to the barbarous slave trade of other times, it owed its origin to this, through the raids made by Portuguese dealers to reduce the natives to slavery, competing with the dealers in Kaffirs and Abyssinians, something similar being done at the same time by Dutch adventurers on the Orinoco and its tributaries.

This inhuman traffic being checked by the spirit of Christianity in general, and in particular by the ecclesiastical zeal of the Church militant, there sprung up from the mande, piassava, bramble, zarrapia, puxiry, the chestnut and other natural products the real commercial industry, which soon progressed with the early plantations of cotton, coffee, cocoa, rice, and maize, and subsequently developed with the discovery and progressive extraction of india-rubber, to which it has lately limited itself, to the prejudice of all other industries, on account of the disproportion existing, and to which we have already referred, between the numbers of the producing population and the plentifulness of this article which, by the way, is only worked on the banks of the Rio Negro and some of its tributaries, because it has not yet become necessary to penetrate into the interior of its virgin forests.

In the whole course of their commercial existence, the Casiquiare and the Upper Rio Negro have given constant proofs of their industrial vitality ; sending a constant flow of the rich and

abundant products of their forests to the markets of Para and Manaos successively, and their trade, which follows the influence and natural attraction of this latter centre, is actively working to join it more closely, in order to better develop its own resources.

Steam Navigation.

Even taking for granted that the commerce and general situation of the Rio Negro did not urgently require the improvement in transport they demand, this transport by itself would suffice to create and meet, in a short time, such a demand, because in Political Economy, as in mere traction or physical rotation, the vehicle imparts its character and its own movements, overcoming all inertia in the direct ratio of its velocity: thus the slowness of that which moves along with difficulty, by dint of rowing and hauling, and hence the prodigious rapidity with which the American deserts of the Far West are covered by the railways which occupy them *à priori*, that is, from the very moment they are bought by the Government from the *redskins*, and officially thrown open to colonisation.

But why go outside and further in search of examples, when the Rio Negro itself provides a conclusive proof of this assertion? As a matter of fact, in February, 1856, that is one year after the establishment of steam navigation between Manaos and Santa Isabel, a distinguished traveller wrote in a vein of sarcasm and reproach, the following note, which he afterwards published in his work: "The steamer, which navigates this river from the bar, ascends as far as Santa Isabel, four days below San Gabriel, to no purpose, for there are neither passengers nor products to carry."

What would this celebrated and unfortunate traveller, who disrespectfully inveighed against the premature development of steam navigation on the Lower Rio Negro, now say if he saw the supplies taken in at its ports, and the volume and value of supply and demand which equilibrate its commerce, and feed the permanent and regular

service of two steamers? He would surely admit that no progress can be premature, nor any advancement be absurd, if in favour of a natural current of industry and culture.

Compare in this connection the age of the oar on the Lower Rio Negro with that of steam of the present day; ascertain the economic difference between the two respective commercial statistics, and then see whether its navigation by steam in general, and the consequent future, would not be to its present navigation what these are to its melancholy past of the war and the warp, or even worse.

On the other hand, and in addition to the decided saving of expense and time, the advantage of capability inherent in the industrial regularity it establishes, the risk and loss it presents, the facilities it offers, and the noble stimulus it calls forth, we must also recognise the excellent results attained by steam navigation in regard to hygiene and the very life of the native population, which is crushed and decimated visibly and day after day by the fatigue, hardships, and epidemics caused by long voyages in the pirogue outside and far away from home, and for this reason is unable to keep up permanent cultivations or to make its own mande, being thus obliged to purchase it of poor quality and pay for it at the same price as rubber.

The merchants of San Carlos de Rio Negro, in their praiseworthy endeavours to second the good intentions of the Governments of Brazil and Venezuela, have made every possible effort calculated to utilise the concessions for mercantile transit granted in the Public treaties between these two countries; but this very benefit becomes difficult and impossible, and is, after all, illusory, dependent on the war alone, through the manifest inconsistency between progress and backwardness, and between calculation and chance, that is, between the anomalies and hazards which characterise this rudimentary system; and the promptness, accuracy, and absolute precision of the great civilised fabrile and manufacturing centres: it is then, for steam navigation to make this improvement a fact, and therefore and on

account of the difficulties that it involves, the High Contracting Parties *mutually* agreed to assist it *in the most efficacious manner, and by such means as should subsequently be determined by special agreements and conventions.* (Article 22.)

In the general geographical description just given, we briefly described the natural features of the Rio Negro in regard to steam navigation, and we now propose, without going into details of investigation to show its peculiar qualities and relative advantages, studying it alone and in comparison with others of recognised importance and magnitude.

Limited, as we have already seen, to an eruptive depression which checks its expansive power, from its source to the Rio Blanco, more or less, its bed and *thalweg* are invariable, and its waters always reach the same level in the corresponding seasons of each year, because, owing to its uniform purity, its slowness and the strength and height of the forest-lined banks, it is not subject to the drift and heaping-up of slime, detrition, débris and snags that would obstruct its course and cause the bed to deviate or change ; consequently the very cause (its granite bed) which interrupts, or rather hinders its navigation at Camanaos and San Gabriel, makes it permanently navigable over the whole of the rest of its course, and we say this because the minimum depth and width and the maximum windings of the navigable channel afford a passage at all times to steamers of light draught and small tonnage, and because the same sand-banks, which have accumulated until now in its last part, through the mechanical action of its current, and the chemical effects of its waters through long ages, and are held there by the counter flood of the Amazon, do not constitute an obstacle of a permanent nature, allow a passage at all seasons to steamers of small draught, and are destined to disappear entirely on the day that necessity and modern industry remove by dredging the work of centuries, as they do continually and almost fruitlessly in the struggle against the current and in the general bed of many other rivers.

Few, very few indeed, are the rivers which, like the equinoctial Rio Negro, are not liable and subject, from the nature of their valleys, to interruption, modification and variation of their beds, successively or periodically, through the alluvial sediment and solid bodies carried along by their streams.

The Nile and the Ganges, for example, geographical models and the chief water-ways of ancient civilisation and commerce, waste a great part of their volume in watering and moistening the sediment-covered valleys of Egypt and Bengal, bear annually a great mass of slime and foreign substances (3%) which continually raise and change its movable bottom, and in spite of dredging and canals, are only really navigable for four months of the year, or during the period of their great rises.

The Danube, the Thames, and the Rhine in Europe, the Mississippi and the St. Lawrence in North America, and the river Plate and Magdalena in South America, and many others, are all more or less engaged in continual struggle against the movement and unsettled state of their beds, and hinder navigation similarly at their mouths through the same phenomenon. The Rio Negro is consequently quite an exception in this respect, because even the Orinoco, of which it is a sister stream, from the similarity of character and structure of their basins, the latitude of their sources, their volume, the uniform symmetry of their course, and their connecting link, does not possess the same advantages, because of the numerous large tributaries of turbid waters and slimy bed which it receives on its left bank.

In addition to the foregoing, and supplementing it, we may mention that steam navigation on the Rio Negro is no mere theory or hypothesis, without precedent and positive practical or experimental foundation, but that, on the contrary, it is based not only on the requisite technical surveys and observations, but also on the success of the three isolated cases on record: First, by the Brazilian and Venezuelan Boundary Commission which ascended in a steam launch as far as

San Carlos de Rio Negro, and returned in it to Manaos; Secondly, by Mr. T. Delort, representative of the late "Compañía General del Orinoco," in 1899, who left Manaos in a small steam launch, ascended as far as San Carlos, and returned to Santa Isabel; and, Thirdly, by the ill-fated Italian who ascended the Rio Negro in 1901, passed on to the Orinoco and descended to Maipures in the tug "Leão," purchased at Manaos, and now the property of various business firms at San Carlos.

And although all these journeys enumerated have been made by the combined use of steam and the warp or muscular strength at Camanaos and San Gabriel, their success proves objectively what we propose to demonstrate: That the steam navigation of the Rio Negro is a problem with a practical solution, and a principal of natural order and of necessity and common welfare.

Economic Table.

General population (about)...	500,000	inhabitants.
Population of the Casiquiare and Guainia	20,000	,,
Annual output of india-rubber	800,000	kilos.
,, ,, rubber ...	4,000	,,
,, ,, piassava ...	300	tons.
,, ,, chestnut ...	1,000	hectolitres.
,, ,, the Rio Blanco	3/6,000	bullocks.
Stock of sheep	25,000	head.
Production of rubber on the Casiquiare	100,000	kilos.
Total amount of exports, *ad valorem*	5,000	contos or £500,000
Foreign imports ...	4,000	,, £400,000

III.—Political Importance.

The preponderance of conquest and the considerable extent of dominion obtained by the Portuguese in South America, and the steadily

increasing development of the power of Brazil which characterise and distinguish it as a really free nation, are, to a great extent, due to the natural privilege which was granted them respectively by the right of discovery and occupation of the Amazon and its tributaries, and the right of *uti possidetis* which was afterwards consecrated by Liberty.

The fortresses of San Felipe, Marabitana, and San Gabriel, erected through the jealousies of dominion and colonisation in 1754 and 1763 respectively, and the boundaries of Brazil with Venezuela and Colombia, in the basin of the Rio Negro, mark and determine the political importance of this river in the past, present, and future, as a road of conquest and of administrative and international communication successively.

The General Assemblies that have hitherto met through the public spirit of International Law, from the memorable Congress of Vienna, the first fruit of civilisation in the last century to the Pan-American, of Mexico, which the present held, with the unanimous object, among others, of establishing and defining the universal principle of *jus transitus*, or free fluvial navigation, and the Public Treaties which the nations interested in it have made, from the Convention of the 9th of June, 1815, signed at Vienna by the Plenipotentiaries of Austria, France, England, Portugal, Prussia, Russia, Sweden, and Norway, and whereby the free navigation was declared of the Rhine, the Neckar, the Main, the Moselle, the Meuse, and the Scheldt, to the Convention made between Brazil and Venezuela in 1860, respecting the common navigation of the Amazon, the Rio Negro, Casiquiare, and the Orinoco, all clearly manifest the general political importance of navigable rivers, and in particular that of these latter, from their peculiar features and admirable topographical situation.

Now that administrative science no longer lies in the magic influence of the sceptre or the waving of the sword, but in the art of governing wisely, performing the greatest amount of good and creating the greatest possible public wealth in the

least possible time, the means and economic necessities of industrial service are mingled and unified with the means and political needs of public service, and the ways of communication consequently become the most important branch of the administrative system.

If, therefore, steam navigation were established over the whole of the Rio Negro, the postal service of each country, *ipso facto*, would be established with their respective frontiers, the political machinery and fiscal system thereof would keep pace with their economical development, and thus the spirit of order which characterises progress would of necessity impress the indelible stamp of international civilisation in the free heart of virgin America.

We might very well, were it not an absurd anachronism, close this chapter by dwelling upon the military importance of the Rio Negro as a route of strategic communication in case of war between neighbouring countries; but if the nineteenth century founded the peace and international civilisation of Europe at Vienna, Paris and Berlin, on the liberty of their rivers, and the ruins of the walls which defended them, with much greater reason should the twentieth century do even more to consolidate in its honour the liberty, order, and progress of the continent of America.

Transit Trade.

In the road followed up to the present by Public International Law from its early stages at the Congress of Vienna to the signing of the most recent Treaties of the present-day diplomacy, the plain and natural law of navigation and transport, under the conventional title of *imperfect* given it by modern jurists, has already taken deep root in the public mind of all nations, and, converted into the principle of international law (*jus gentium*) or universal legislation, it is the common device which figures on the flags of all the merchant ships of the world.

Unfortunately, the natural and artificial inequalities of the universe and of the human race

and the selfish individual and collective interest which socialism in its order and internationalism in its sphere wish to destroy by the distribution of property, the unity of language, the uniformity of money, weights and measures, and the levelling of tariffs, being opposed to the practice *in integrum* of these universal systems, have subjected, and always do subject, the spirit of philanthropy of the law to conventional restrictions and regulations which of necessity hinder the free exercise thereof.

Hence the recognition of the regulations as to river police service embodied in all agreements from article 109 of the Convention of Vienna to the ninth and following of the agreement entered into between Brazil and Venezuela, drawn up respectively in the following terms :

"Navigation over the whole course of the rivers mentioned in the preceding article, from the point at which each one becomes navigable to its mouth, shall be entirely free and shall not, as regards commerce, be forbidden to anyone ; although it will be necessary to conform to the regulations as to the policing thereof, which shall be framed in a uniform manner for all, and as favourable as possible to the commerce of all nations." (Article 109 of the Convention of Vienna.)

"Such regulations as may be made by the High Contracting Parties shall be the most favourable to navigation and commerce between the two countries."

"Each of the two States shall adapt in the part of the river belonging to it, so far as may be possible, and by mutual agreement, a uniform system of river police, and shall endeavour to ensure such uniformity with regard to the fiscal system and policy which it may establish in the commercial ports." (Article 9 of the Convention entered into between Brazil and Venezuela.)

In accordance with the spirit of this clause, and in compliance therewith, Brazil has dictated, and is faithfully carrying out, the regulations it was incumbent upon her to fix, in order to make effective the pure and beneficial observance of the liberty granted as regards rivers, bearing in mind, as far as she has been able, the true difficulties or

the material inconsistency existing between the embryo rude or primitive exercise of this right, fiscal obligation and private obligation.

In fact, however generous, far-seeing, and complacent the spirit of adaptation and the letter of the law may be, they can never completely fill the voids or defects of what by nature and system is opposed to it, anomalous and unforeseen, because it is humanly and legally quite impossible to govern by regulations, what is in itself irregular in form and essence, and therefore on this account the High Contracting Parties immediately conceived the idea of steam navigation on the Rio Negro, Casiquiare and Orinoco, as a condition inherent in the freedom of navigation and commerce granted and proposed thenceforth to assist it efficaciously and jointly, recording for this purpose their intention in Article 22 of the aforesaid Convention, which states: "The High Contracting Powers, knowing how costly steam navigation schemes are and that at first no profit can be obtained by the first Venezuelan or Brazilian Company formed for steam navigation between the two countries by means of their rivers, mutually agree to assist it in such manner and by such means as shall be subsequently adopted in special conventions and agreements."

What the *special conventions and agreements* specified in the above article are to be, what measures are to be determined in them, and how much help is to be afforded respectively to the Company, may be deduced from the spirit of civilisation and progress, and from the palpable equity evident in the body of the treaty; from the illustration and progressive growth of this same spirit in both nations, and finally from the creditable acts to their honour, that is to say, the means and assistance with which they have hitherto favoured the development of steam navigation on other rivers, particularly on the Amazon and its tributaries, including the Rio Negro itself, because it is a duty of conscience, which ennobles humanity, to do justice to merit, recognising in this case the exemplary supremacy of Brazil as a

nation which knows how to stimulate industrial progress by wise economy.

A just remuneration which will compensate on the part of Brazil the works required by the free navigation of the Rio Negro in her territory, and the public services which the Company will naturally bind itself to perform, the exemption from customs duties at the specified time, and on the part of the Republics of Colombia and Venezuela, for the purpose of encouraging the service and directly favouring the production, consumption, and general development of their respective territories, with some concessions as to colonisation, will suffice for the purposes of the Company, to establish steam navigation on the Rio Negro over the whole of its commercial part, and to ensure thereby the effective progress and welfare of the most important and privileged international region of South America.

In proposing what is incumbent on Colombia and Venezuela in the carrying out of the work I suggest, I take as a basis :

Firstly :—The evidentness and magnitude of the benefit received by them both jointly. Secondly :—The creditable precedents established by these two nations in the annals of their internal progress, wherein it is shown by laws and decrees that both have already granted these same favourable concessions for the purpose of assisting colonisation, industrial development, and steam navigation in similar regions, particularly in the territories of Casanare and San Martin, the Upper Orinoco, and the Amazon, which geographically and economically considered are nothing but a wonderful complement of that of the Rio Negro, with which they form, as may be seen in the general plan thereof, a harmonious whole, whose natural centre gravitates on the orographic axis of Pimichin, and whose industrial point of support, in the Law which continues its progress, necessarily rests on the economic centre marked out by the capital city of the State of Amazonas : and Thirdly :—The physical difficulties which would arise from the difference in customs tariffs which exists between the two countries, applied to the

common interest of one and the same region; and the small amount in the early stage of its political and industrial development.

As regards Brazil and the State of Amazonas in particular it will suffice to state that its industrial philanthropy does not require demonstration or commentary, and to insert below a list of the steamship lines subsidised by the two entities.

Steamship lines subsidised by the State of Amazonas, from Manaos:

Line to Maues, contract of the 8th May, 1900, round trip, 8 days: annual subsidy	144	contos.
Line to Coary and Badajos, contract of the 18th January, 1899, round trip from 8 to 9 days	96	,,
Line to Iza, contract of the 30th May, 1901, round trip 12 days ...	108	,,
Line to Oliveira Machado, contract of the 21st July, 1900, round trip an hour and a half, two a week...	24	,,
Line to Yanaguaca, contract of the 7th May, 1900, 1 weekly round trip 3 days...	59	,,
Line between Genova and Manaos (Ligure Braziliana) contract of the 4th May, 1897, for trips every two months	120	,,
Line to the Rio Blanco, contract of 9th May, 1898, round trip, 6 to 8 days	144	,,
Line to the river Aripuana on the Madera, contract of May, 1900, round trip 8 days...	72	,,
Line to the river Autaz, contract of May, 1900, round trip 8 days ...	72	,,
Line to the river Yapura (Caqueta) contract of the 8th May, 1899, round trip 10 days	120	,,
In annual subsidies	959	contos.

Steamship lines subsidised by the Government of the United States of Brazil, by decree No. 2,054 of the 25th of July, 1895:

Annual subsidy	...	...	.. 421	contos.
Monthly subsidy	...	...	... 35	,,

In addition to concessions of lands for colonisation and bodegas.

First line: Belem to Manaos.

Second line: Manaos to Iquitos in Peru.

Third line: Belem to Bayao on the Rio Tocantins.

Fourth line: Belem to Macapa.

Fifth line: Belem and Manaos to Huytanaha, on the river Purus.

Sixth line: Belem and Manaos to San Antonio on the Rio Madera.

Seventh line: Manaos to Santa Isabel on the Rio Negro.

Eighth line: Belem to the river Araquary.

IV.—San Gabriel and Camanaos.

Leaving exact terms and calculations until the moment arrives to make the plan of the rivers and initiate practically the solving of the problem with which I propose to deal, I will proceed to make known at once its nature, the various means of solution applicable to that end, and the most advisable method to adopt, based on inherent reasons and advantages.

The Rio Negro, as I have already said, being influenced by the terminal spurs of the Parima or Anari range, which separate it from the Yapura, and determine its confluence with the Vaupez, bends sharply to the East, accelerating its speed and dividing its waters in the volcanic bosom of the range, which, forced in its turn by the powerful impetus of its volume, made way for it, and in return compresses and bifurcate it successively at San Gabriel and Camanaos, obstructing its course with all its strength, and hindering its stream with its rocks.

Over the whole of this difficult and dangerous section (40 kilomètres), hydraulic power has overcome the resistance of the granite rocks in the cosmic struggle and chemical action of ages, and has succeeded in opening a permanent channel, more or less narrow, swift-flowing and deep, but always navigable and open to improvement and the influence of human progress.

The peculiar structure of this river, particularly at its most important point, *i.e.*, at San Gabriel, the considerable diminution of the channel at "La Fortaleza," and its great bifurcation at "Crocoby," between "Curucuy" and "Bubure," with a volume of not less than 6,000 cubic mètres per second at the lowest water-level, determines objectively the best solution of the problem of steam navigation of the Rio Negro.

And if, to these facts, are added the constant relationship as to level which exists between the bed of the Bubure and that of Curucuy at the bifurcation at Crocoby, and the corresponding combination of currents, it will readily be seen that the channel of the latter river exists in connection with the former, and that consequently any increase of volume in the one would be equivalent to a proportional decrease in the other, without prejudice to the common volume, especially if we take into account that in widening the channel of the Curucuy, for example, on the southern bank, by removing the obstacles which narrow or hinder it in its course, there would be no appreciable alteration of desequilibrium of level apart from the river, that is, in the previous common mass.

So that, taking at its full value the common opinion that the falls of the Rio Negro are, like those of other rivers, *the unchanging regulator* of its volume, we think that the making of channels there would not disturb in any way the general equilibrium of such volume, just as the Suez and Panama Canals, and the proposed canal between the Caspian and the Black Sea will not, thanks to Divine Wisdom and Natural Law, occasion any disastrous change of level.

And this objection or theory should be so much

the less a matter of anxiety, so long as there is no sufficient proof on scientific grounds of the supposition that the making of channels on the Rio Negro, particularly at Curucuy, will reduce the navigable volume of 490 kilomètres of its upper part by a less quantity than the contents of the lower navigable part of 840 kilomètres.

This same system, if supplied at Camanaos, and wherever the features of the channel may require it, will undoubtedly be the most natural, expeditious, and advantageous of all systems that might be proposed for the permanent establishment of general navigation on the Rio Negro.

Human industry may employ three methods for the utilisation of the current of the Rio Negro as a way of communication and general progress.

Firstly: Connect the navigation of the Upper and Lower Rio Negro by a railway line between Carapana (mouth of the Vaupez), and Camanaos (4 kilomètres). Secondly: Connect the abovementioned navigation at San Gabriel by means of a railway which would pass the falls of Curucuy and La Fortaleza (about 1,500 mètres), improving the remainder of the channel between Carapana, San Gabriel, and Camanaos; and, Thirdly: Improve the channel of the river from Carapana to Camanaos, removing the chief obstacles which obstruct its course.

Of these systems, the first two have, in addition to the expense inseparable from the construction and upkeep of a mixed and double line, the great objection of actually creating a break or solution of continuity, with all the drawbacks and disadvantages peculiar to any change or transhipment.

There remains then the third, with all the features lacking in the others, particularly the advantage of unity or continuity of the route, with its inherent advantages and its proper permanent upkeep.

In the plan I propose to draft, and which will form a supplement to this paper, the features enumerated will be clearly shown, and it will be possible to make a graphic comparison of the three suggested methods.

V.—Auxiliary and Complementary Ways and Zones.

If it is difficult to imagine in the abstract the extent and immensity of an ordinary region, this difficulty reaches its climax and borders on the impossible when it is a matter of summarising, without any detriment to its merit, one of the most vast, varied, and admirable works of Creation, and it is for this reason that we should not like to attempt such a task, from which we are kept back by the fear of mutilating the marvellous connection and harmony of the whole, by imperfect lines and details.

Although the central torrent of Yavita and Pimichin has undoubtedly been the oldest route of communication between the Orinoco and the Rio Negro, on account of the shorter distance and the affinity of nature and people which exist between the Atabapo and the Guainia, and although this may become the favoured route of the future, we shall begin by describing the Casiquiare and Upper Orinoco routes to keep to azimuth order.

Casiquiare : With its chief sources in the very bed of the Upper Orinoco, but with its own basin and zone, the Casiquiare separates from it in latitude 3° 10′ N. and longitude 67° 55′ W. of Greenwich, at a height of 286 mètres above sea level ; and following a narrow winding course with a general N.E.-N.W. direction for a distance of 500 kilomètres, it receives the Siapa and the Pasimoni on its left bank, and flows into the Rio Negro, establishing a free communication between it and the Orinoco with about one-third of the main volume.

Discovered in 1744 by the Reverend Father Manuel Roman of the Company of Jesus in the fortunate meeting with the Portuguese trader Francisco Javier Morales, it became at once the ordinary route of communication between the Catholic missions on either river who founded some villages on their banks with the Guarany emigrants from the Vare tribe or family, from whom the present inhabitants are descended.

The political zeal of the Spanish Conquest raised the little fort of "*Buena Guardia*" at the Southern corner of its source, and the Boundary Commission of Iturriaga and Solano gave this latter name to its chief town, which was where, later on, in 1860, the French citizen, M. Trouchon, discovered india-rubber, and established the systematic and industrial working thereof.

Its banks are in general swampy and its granite bed in many places reduces its course to narrow winding channels with a swift-flowing current, very shallow at its great descents.

Upper Orinoco: This name is given to the river Orinoco from the streams of Atures and Maipures, which intercept its navigable course, establishing thereon a genuine solution of continuity, to its main sources.

The general course of this river, and its chief geographical features, from its separation from the Casiquiare to its fall into the Gulf of Paria, are too well known for me to stop to give a detailed account of it in this brief description, and therefore I shall have to confine myself to following it from the bifurcation to the Esmeralda (15 kilomètres), in order to fix this point at the site of the old Spanish missions, and as the port of the cart-road which formerly connected these missions with those of Caura, Caroni, and Essequibo, in the Guyanas, and through which the cattle and provisions required for their sustenance and work were conveyed.

Esmeralda Road: It is reported that the tracks of wheels on the rocks, which paved the road at that time, and the buttresses of some bridges, still remain.

The Maquiritare tribe which inhabited the banks and Eastern watersheds of the Upper Orinoco, from the Ventuario to the Ocamo, usually communicate with the Macuchies of the Rio Blanco and Essequibo and trade with them in spices, by which means the former tribe are able to obtain the famous English guns imported through Demerara, and known on the Orinoco, Casiquiare and Rio Negro, under the name of *maquiritaras*.

From the ill-fated expedition of Bobadilla in 1764 to the journey of the French explorer Chaffanjon in 1887 no one has gone beyond the stream of Guaharibos (22° 21′ 0″ N.—66° 25′ 20″ W.) where the navigable Orinoco begins and ends, so that until now no one has yet quenched the thirst of exploration in the real sources of the great river.

All the regions lying between the principal watersheds of the Orinoco in the immense semicircle that encloses its course, *i.e.*, on their orographic axis, is in general a gigantic mineralogical tree, which has already been worked in the Guianas, and of whose valuable trunk we have seen splendid manifestations.

This important region, be it said to the credit of our conquerors, was better known, more prosperous and happy in times which we call the ages of darkness and servitude. It is bounded by the pasture zones of the Caura and Caroni in Venezuela and of the Essequibo and Rio Blanco in Brazil and in British Guiana, abounds in natural resources, maintains a large native population, and by the wealth of its soil, facilities of communication and advantageous topographical position, is destined to play in the industrial theatre of South America an even more important part than California and the Rocky Mountains.

For reasons of nationality and consequent commercial connections, this is the most frequented route between the towns of San Carlos, San Fernando de Atabapo and Ciudad Bolivar, capital of the State of Guiana in the Republic of Venezuela and centre of the chief market of the immense region which it comprises in its extensive and admirable radiation of arteries, from its narrow limits with the Essequibo to its union with the Rio Negro and the Amazon, and hence to the Andine summits which separate it from the Magdalena and the Zulia in the interior of Colombia, being a lineal extent of 2,600 mètres by an area of 7,800 square kilomètres and a volume of about 10,000 cubic mètres per second.

This river is navigable by steam from the stream of Guaharibos to that of Maipures (1,145 kilo-

mètres), from the mouth of the Tuparro to Atures (45 kilomètres) and from the port of Perico, at the foot of the Atures stream to the sea (1,220 kilomètres).

As will be seen, there are on it two breaks of 7 and 10 kilomètres which are unfortunately impossible to pass by means of canals; they would, however, be negociated by a railway line, which would be easy to make, thanks to the geological and topographical advantages offered by the left bank from the port of Panumana at the lower part to that of Maipures at the upper (120 kilomètres).

As until now there is steamship service only as far as Caicara (995 kilomètres), it results that a complete voyage from San Carlos de Rio Negro to Ciudad Bolivar, is a doubtful affair of at least six months, bristling with discomforts and dangers, as its counterpart formerly was, from the same point of departure to the Para, until steam navigation reduced the perils and duration of the journey from this port to Santa Isabel.

Apure and Arauca.—These chief tributaries of the Orinoco, as regards industry and navigable stream, constitute through ways of communication with the Eastern Andes of Colombia and Venezuela, and in conjunction with the Meta form the admirable and immense system of irrigation which makes one of the most promising luxuriant and prolific grazing and agricultural zones in South America, destined from its productive capacity and splendid topographical position to counterbalance the abundance of the Plata in Argentina and Uruguay, established the equilibrium of the cattle trade between the north and south of South America, to the advantage of the equatorial mountain zones; and between South and North America to the mutual benefit of consumption and universal economy.

Meta: The dividing line between the great sedimentary or alluvial basin of the Apure and Arauca and detritic formation which girds the Vita, Tomo, Tuparro and Vichada, it suffices alone to show the future of these regions and marks the best path of international friendship

and prosperity of Venezuela and Colombia, on the day that these two countries in the name of civilisation, progress, national integrity, and their common welfare, set aside the youthful jealousy and rivalries between them, and bury fraternally in its waters the insane disputes for dominion which have existed until now.

Its extensive system of navigable tributaries, its favourable conditions to the very foot of the Andes, its excellent pasture grounds, the fertility of its plains, and rich saline and carboniferous deposits on its principal watersheds, mark and distinguish it as a prime factor in the future of the northern pampas.

LAND ROUTES: To my historical and chartographic studies on the eastern regions of Colombia and to the political furies or accesses of this latter country, to my enterprising spirit and the great favour of my good friends and companions Messrs. Ramon Real and Miguel Afanador, is due the exploration of the most important and best natural way that Providence has traced out on earth to connect spontaneously the distant base of the high inland mountains with the shores of the sea.

This way is constituted by the *divortio acquarum* of the southern watersheds of the Meta and the unique detritic formation of its zone and consists of a continuous open bank or macadam of 1,500 mètres average width, which leaving *San Martin* on the eastern slope of the cordillera of Sumapaz, descends to the Orinoco in a uniform level, ramifying in four secondary derivations and separating the valleys of the Meta and the Ariari, from the Vichada, Tomo, Tuparro, and Vita, in such a manner that thanks to it and the extreme force of the Tequendama and Atures, it will be possible in the future without greater industrial efforts, to consider Bogota, capital of Colombia, on both the Orinoco and the Amazon.

Such is the natural excellence of this route that the Guahiva tribe which peoples the zone, speak of it in their language or dialect under the graphic and expressive name of "*Diosa namuto*," or *Road of God*.

In my last journey to Bogota I published there the account of this expedition, and at the request of my distinguished master and friend, Professor Francisco Javier Vergara Velasco, I handed him the sketch and descriptive report thereof, with the hope that the patriotic zeal of my country might one day make use of the information or results of economic and political equation of its national welfare and prosperity.

Rio Vichada : The dividing line between the plains of the Meta, the Arauca and the Apure on the north, and the forests of the Guaviare, Rio Negro, and Caqueta or Yapura on the south, it is undoubtedly one of the most important tributaries of the Upper Orinoco on account of the excellent features of its bed and stream, the mildness of its climate, the picturesque topography of its valley, its natural resources, auxiliary river and land communications, and its large and industrious primitive population.

Rio Guaviare : Not without reason does the Colombian geographer and author whom we have with just pride and pleasure quoted state that this river is "one of the best hopes of Eastern Colombia," because in conjunction with the Granada Andes and the basins of the Amazon and Orinoco it carries out a common mission of vast importance which the economic and political concert or agreement of Brazil, Colombia, and Venezuela will utilise to advantage the day that civilised industry establishes steam navigation on its waters, in constant connection with the streams of the Orinoco, Atabapo, Casiquiare and Rio Negro jointly.

Then the traveller and the products of the eastern cordillera of the Andes will be able to descend to the Orinoco and the Amazon with greater facility, less expense and more profit than to Barranquilla, and the fluvial monopoly of the Magdalena would thus lose its present force of obligatory necessity in the scale of the industrial equilibrium of transport which would naturally be established.

ATABAPO AND PIMICHIN: The common boundary between the Republics of Colombia and Venezuela, it is the most direct and open way to travel from the Orinoco to the Amazon and vice-versa; because being in easy connection with the *portage* of Yavita and Pimichin, it constitutes the chord of the great arc formed by the Rio Negro, Casiquiare and Orinoco in the longitudinal proportion of 7 to 10.

Enough has been said, from Humbolt to Crévaux, regarding this apparent or narrow separation between the Amazon and the Orinoco at the Isthmus of Tunahi or Pimichin, to render it unnecessary for me to attempt to add anything on the subject of this further canalisation, and I must therefore confine myself to quoting here the poetic inspiration of the celebrated English traveller and naturalist A. R. Wallace, and the authorized opinion of the distinguished Venezuelan traveller Francisco Michelena y Rojas, which now serves as a glorious epitaph from the interesting pages of his work "*Official Exploration*," in the magnificent pantheon in which God has been pleased to seal on earth His patriotic love and His geographic existence.

A description of Javita or Pimichin, by Alfred Russell Wallace, LL.D., "*Travels on the Orinoco and Rio Negro*":

"'Tis where the streams divide, to swell the floods
Of the two mighty rivers of our globe;
Where gushing brooklets in their narrow beds
Lie hid, o'ershadow'd by the eternal woods,
And trickle onwards,—these to increase the wave
Of turbid Orinooko; those by a longer course
In the Black River's isle-strewn bed, flow down
To mighty Amazon, the river-king,
And, mingled with his all-engulfing stream,
Go to the battle with proud Ocean's self,
And drive him back even from his own domain. . . . ."

"Everyone knows that between the valleys of the Orinoco and the Amazon there exists an easy and permanent water communication by means of the Casiquiare, a river of great volume, formed not only by the waters which the Orinoco sends to the Negro, but also by those of many others it

receives on either bank. But many are unaware that apart from this magnificent communication, there exists another by land, more direct, more comfortable, much shorter, and more economical than the former, *viz.* : the route over the Isthmus of Pimichin, a drag-road between the navigable channel of this name, a tributary of the Guainia or Negro and the Temi, the first tributary of the Atabapo ; a natural channel which, with very little preparatory work, could be made navigable on account of its almost perfect level with both rivers in the area it occupies, ten or twelve miles, and from the immense number of springs found over its whole course. At the present time it is the route most frequented for the reasons enumerated, with two towns at each end, Maroa and Yavita, which fully meet all the needs of commerce ; the first at Rio Negro, facing the mouth of the Pimichin ; the second, on the bank of the Temi, which falls into the Atabapo.

"The two valleys being thus connected by two such remarkable ways, industry and commerce will lead to the improvement of these latter, introducing steam wherever it is not already in use. In this way a merchant of Para or the Upper Amazon, in Gallaga, the Ucayali or the Napo, would not only come to do business in the north of South America to the very mouth of the Orinoco, but would afterwards ascend the Meta to ten or twelve leagues of Bogota, the capital of New Granada, whence, by means of carts or even rail, he would in a very short space of time reach the capital with his cargo. What country in the world has such interior means of communication ?"

(F. M. Rojas, p. 498).

But the geographical unity of the Amazon and Orinoco on the connecting stream of the Rio Negro is not confined to this great variety of ways and zones, for beyond the sources of the latter river, and in the immense area included in them, the Guaviare, Andes, the Caqueta or Yapura, there still exists the unexplored dominions of the warlike Omauas whom Jorge de Espira and Felipe de Utre attempted in vain to conquer

with the arms of their ambition, pride, and Spanish valour.

As will be seen then by this brief analysis and the supplementary plan, the Rio Negro is, properly and geographically considered, the great axis of connection between the two most powerful foci of industrial and political radiation existing in the regions of the Amazon and Orinoco and in the realms of universal geography.

* * *

We could say much more on our own account and by enlarging, correcting or copying what others have written on each one of the points or chapters of our paper; because these, like the sources and tributaries of the great river with which we are dealing, are inexhaustible sources of exploration, study, and learning. But we have already gone far beyond the limits we had fixed for our plan and it therefore becomes necessary to recapitulate, concentrating in the scheme and in the civilising work of steam navigation of the Rio Negro which we propose to carry out, the ideas, principles and facts already enumerated, in order to produce by their economic addition an incalculable sum of national power, resources, civilisation, and progress, since, as we have already said at the beginning, it is the opportune hour to add together on the river the common interests, rights, and duties of the three countries who are joint owners.

Yes, now that the civilised reaction of liberty, independence, and sovereignty of the South American peoples is beginning to make itself felt in the vigorous organism of their privileged natural, now that jealousies of domination, conquest, and sovereignty have disappeared owing to the common risks of their national integrity and the fraternity and universal patriotic love of economic colonisation; that the existence of the Casiquiare and the Isthmus of Tunahi or Pimichin is a common geographical fact; that the falls of San Gabriel and Camanaos no longer appear an

impassable barrier and that the existence is incontestable of the fabled *el dorado* which Pizarro and Raleigh sought with all the *aura sacri fames* of their time in the famed opulent empire of Manoa, it would be an offence against humanity, civilisation, and fatherland, to neglect any longer the means available to make effective the resources which Brazil, Colombia, and Venezuela in particular, and South America and the universe in general, possess in these invaluable treasures of human welfare and international prosperity.

And the Amazon, as the aorta of the South American continent is destined to carry on its waves the civilising flood of the Ocean to all the huge organism which is fed and vivified by its innumerable palpitating arteries, among which stands out, as a social, economic, and political bond of peace, progress, and fraternity, the great and remarkable stream of the Rio Negro which urges on Manaos and where by good fortune my greatest industrial aspirations now lie.

LEONIDAS NORZAGARAY-ELICECHEA.

LONDON, July 20th, 1905.

AVISO

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